
SECTION 27 41 16AV SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY:

- A. Section Includes: Services as listed herein and related to the furnishing, installation, and commissioning of audio, video and communications equipment at two locations: The City of Santa Rosa City Council Chambers (Council Chambers), and the West College Training Facility (West College).
- B. Related Sections: Coordinate with the following sections in carrying out this work:
 - 1. Division 26 – Electrical

1.02 UNIT PRICING

- A. Provide unit pricing for all items in the equipment list.

1.03 REFERENCES:

- A. Comply with all national, state and local regulations and the procedures and requirements of the local authorities. In the event of conflict between these specifications and the applicable regulations, the more stringent shall govern.
 - 1. Codes:
 - a. California Building Code (CBC)
 - b. California Electric Code (CEC)
 - c. National Electric Code (NEC)
 - 2. Standards & Organizations:
 - a. National Fire Protection Association (NFPA)
 - b. Federal Communications Commission (FCC)
 - c. ANSI American National Standards Institute
 - d. ASA American Standards Association
 - e. ASTM American Society for Testing Materials
 - f. EIA/TIA Electronic Industries Association/Telecommunications Industries Association
 - g. ETL Electrical Testing Laboratories
 - h. ISO International Standards Organization
 - i. NEMA National Electrical Manufacturer's Association
 - j. UL Underwriter's Laboratories
 - k. ESTA Entertainment Services and Technology Association

- B. Equipment shall be provided in accordance with the related trade and regulatory guidelines including but not limited to UL, NEC, IEEE, and all manufacturer's recommendations and requirements. Contractor shall be responsible in the event that work under their control voids or jeopardizes manufacturers' warranties.
- C. Labor shall be provided in accordance with applicable labor regulations and practices.

1.04 DEFINITIONS:

- A. Refer to the General Conditions for definitions.
- B. Owner's Representative: For the scope in this Section, authorized personnel representing the City of Santa Rosa, CA and the Shalleck Collaborative, AV Consultants.

1.05 DEMOLITION

- A. It is under the scope of this work to provide demolition services at locations as indicated in the drawings and specifications. See room-by-room descriptions below.
- B. The contractor shall remove equipment from existing AV racks that will not be re-used, and notify the Owner's Representative when ready for removal.
- C. Any existing wiring that will not be re-used shall be removed from conduit and transferred to owner.
- D. Some equipment will be re-used. The contractor is responsible to identify these items and retain for use, including complete connection and testing. If any items are found to be defective or otherwise non-functional, alert the owner's representative immediately.

1.06 SYSTEM DESCRIPTION- COUNCIL CHAMBERS

A. Broadcast Systems

1. Demolition

- a. Remove wall-mount swing-out rack and floor-mount rack. Replace with new swing-out rack, and put all (e) equipment into new rack. Connect complete and confirm all equipment is functional and operating as it was prior to the change. New rack must fit below (e) wall-mounted relay-based voting system.
- b. Remove wall-mount open frame data rack. Replace with new floor-mount rack, and put all (e) equipment into new rack. Connect complete and confirm all equipment is functional and operating as it was prior to the change.
- c. Remove all existing broadcast equipment, including broadcast furniture system.

2. Switching & Monitoring

- a. Provide a broadcast-style production video switcher with integrated multiviewer, video playback from HDD, and CG software with all accessories as shown in the equipment list and in the drawings.
- b. The video switcher shall be configured and programmed to be fully operable, and be delivered in a "turn-key" manner.
- c. A professional grade, HDCP-compliant LCD monitor with 3G HD-SDI inputs shall be provided for use with the switcher's multiviewer output.
- d. Provide powered loudspeakers for audio monitoring.
- e. Two (8) hour days of factory-representative training shall be provided as part of this scope.

3. Titles

- a. A Windows 7 Pro- based playback system running software from the switcher manufacturer shall be provided as specified.
 - b. The windows computer specifications shall include (minimum):
 - 1) Intel® Core 2 or better processor that supports SSE2
 - 2) ATI or NVIDIA DirectX 9-capable graphics card with 64MB RAM and minimum 1280x800 screen resolution
 - 3) Latest TriCaster Software
 - 4) Gigabit Ethernet connection
 - 5) 4 Gigabyte of system RAM
 - 6) 500 GB SATA system drive
 - 7) CD/DVD-ROM Drive
 - 8) Windows 7 Professional Operating System w/ XP option
 - 9) DirectX™ 9.0c or higher
 - c. An HDCP-compliant LCD monitor shall be provided for use with the CG software.
 - d. A gigabit network connection to a local switch shall be provided for control of the switcher's built-in CG capabilities.
4. Cameras & Control
- a. Provide (4) pan/tilt/zoom cameras with remote CCU and HD-SDI output card. Provide mounts as indicated in the drawings. Two cameras are to be mounted in dome enclosures, as shown on the drawings. Provide (2) fixed view HD cameras for confidence monitoring, complete with mounts.
 - b. Provide a PTZ camera controller, complete with preset recall, access to PTZ functions, and CCU functions. The unit shall accept tally signals from the video switcher, which shall be passed along to the camera tally light.
5. Utility
- a. For cable TV confidence monitoring, provide a small LCD panel with integrated CATV tuner.
 - b. For utility playback, provide a blu-ray player with component analog outputs.
 - c. Several video converters, distribution amplifiers, and a sync/test generator shall be provided.
 - d. Provide patchbays for audio, video & data as indicated in the drawings, complete with patchcords in quantities indicated.
 - e. Provide a UPS unit. Fan shall only operate when UPS is running on battery power.
 - f. Provide in-rack power distribution systems. These will connect to wall outlets, which are fed from a motorized breaker panel with sequencing card. Provide simple button panel with key-lock to turn the system on and off.
 - g. In order to integrate properly with the city-wide cable TV government access channel and streaming encoder, provide separate composite video and analog audio outputs. The outbound CATV feed shall be connected to the (e) fiber optic transport, and the streaming feed shall be connected to the composite video and stereo audio input to the streaming encoder. The streaming encoder is OFCI.
 - h. Provide an IP-based captioning encoder. The city shall separately contract with an outside service provider for live captioning. The system works via audio and serial data over IP connection. It is in the scope of this contract to assist the remote service provider with proper setup of the remote IP slave unit, and confirm a complete and working system. Closed caption feeds will be provided to the outbound CATV feed, as well as the outbound streaming feed. Confirm captioning is active on both output feeds, and assist the city with troubleshooting any issues with third-party service providers.

- i. Provide a furniture system for the broadcast control desk as shown in the drawings.
 - 1) Base module: Winsted LCD/3 Console with central cableway, floor levelers, footrest and all necessary hardware.
 - 2) Finishing Panels: Provide exterior steel finishing panels for sides & top of assembly. All steel parts shall be provided in black, all wood parts shall be finished using a manufacturer standard laminate, to be determined during the submittal phase.
 - 3) Work Surface. Provide continuous work surface, made of MDF with high-pressure laminate.
 - 4) Provide sliding rack drawers for any unused rack space in the lower rack section, and provide blank panels for any unused rack space in the upper section.
 - j. Monitor Mount
 - 1) Provide floor-standing monitor mount for broadcast multi-viewer and CATV confidence monitors.
 - 2) Field-locate monitor stand based on final layout of production switcher operator.
6. Existing Equipment Racks & Equipment- Presentation
- a. Currently, the council chamber presentation equipment resides in two separate equipment racks. While the system generally works OK, it is hard to troubleshoot and needs a general clean-up. In order to facilitate this, the two (2) existing racks will be removed, and all equipment will be moved into one new full-height swing-out rack. It is in the scope of this work to complete the move, including any new wiring extensions required. We have endeavored to place the rack where the least amount of extension would be needed.
 - b. Follow industry best-practices for installation, including proper lacing bars, cable strain relief, and associated methods.
 - c. Provide rack mount kits for any device in the rack that is not currently rack-mounted.
 - d. New power, power raceways, and an isolated ground buss bar will be added to the rack. Coordinate with the electrical contractor for proper installation.
 - e. After the equipment is moved and connected, it is in the scope of this work to confirm all equipment is properly functioning, and operates as it did prior to the move.
7. Existing Equipment Racks & Equipment- Data/IT systems
- a. Currently, the council chamber data equipment resides in a small open frame wall-mounted rack. In order to facilitate system growth, the rack will be removed, and all equipment will be moved into one new full-height floor-mount open-frame rack. It is in the scope of this work to complete the move, including any new wiring extensions required. We have endeavored to place the rack where the least amount of extension would be needed.
 - b. Follow industry best-practices for installation, including proper lacing bars, cable strain relief, and associated methods. The final product should have a workmanship-like quality.
 - c. New power, power raceways, and an isolated ground will be added to the rack. Coordinate with the electrical contractor for proper installation.
 - d. After the equipment is moved and connected, it is in the scope of this work to confirm all equipment is properly functioning, and operates as it did prior to the move.

B. Presentation Systems

1. Demolition

- a. Remove all existing fixed and PTZ cameras and related power supplies, controls, mounts, (2) posts at rear of seating area, etc.
 - b. Remove front projection screen.
 - c. Remove and reuse video projector, but with new lens and wall mount.
2. General
 - a. All devices located on work surfaces (lectern) shall be field-set with regards to their final position and cable path. Do not affix these items until the owner's representative has provided final guidance.
3. Audio Systems
 - a. Add (1) new microphone with flush-mounted connection panel adjacent the document camera area. Coordinate with Owner's Representative for exact placement.
 - b. Panel shall be finished flush into the work surface.
4. Audio DSP Programming
 - a. Updates to the (e) audio DSP programming will be required, and are in the scope of this work.
 - b. Connect to the broadcast systems as shown in the drawings, confirm proper signal.
5. Video Systems - Display
 - a. Provide new motorized roll-down projection screen at the location shown on the drawings. The screen surface shall be matte white. The projection screen case shall be white. Provide additional black drop as needed to match the display area height shown on the drawings.
 - b. The existing projector and CAT-based transport system will be wall mounted at location as shown on the drawings. Provide a new lens as shown. The lens shall be in the middle of the zoom range.
 - c. Provide (2) flat-panel LCD video displays at location as shown on the drawings. Mounts shall allow up to 90-degree range of adjustment. Set viewing angle for optimal viewing by city council members. Displays shall receive VGA and RS-232 control signals via CAT-based transport.
 - d. Connect to the broadcast systems as shown in the drawings with new VGA distribution amplifier and VGA to HD-SDI scaler. Confirm proper signal.
 - e. Replace existing DVD/VHS player with new blu-ray player, connect using (e) YC over CAT transport device. Provide programming services to allow new player to work with existing control system.
 - f. Provide new 4-button panel with custom-engraving at public speakers table. The button shall allow users to perform simple source select commands. See programming section below.
 - g. Provide all structural engineering, complete with stamped drawings, showing the projection screen, video projector mounting, and flat panel display mounting. All structural engineering services are within this scope of work.
 - h. Provide structural backing as necessary to facilitate proper mounting of all devices. Any cosmetic repair work caused by installation of backing is part of this scope.
 - i. Provide all services related to repair of wall finishes, structural supports, etc caused by installation of the AV devices outlined in this scope. This includes drywall, plaster, painting, and other requirements as necessary to return disturbed finished to their original state.

6. Control System

- a. Additional control system programming will be required to facilitate the work in this scope. This programming is in the scope of this work. Existing code will be provided to the winning bidder.
- b. Additions to the existing control system shall include:
 - 1) Motorized Projection Screen (up/down/stop)
 - 2) Relocation of (e) video projector to new location (on/off/source/mute)
 - 3) Addition of (2) new flat-panel video displays (on/off/source/mute)
 - 4) Addition of new button panel at public lectern for local source select: "Document Camera," "Laptop Computer," and "DVD."
 - 5) Replacement of DVD/VHS player with blu-ray player.
 - 6) System power on/off

7. Utility/General

- a. Provide all required mounting hardware and stamped structural engineering drawings showing complete structural calculations for all AV device attachments.

1.07 SYSTEM DESCRIPTION- WEST COLLEGE LOCATION

A. Demolition & Conduit Installation

1. The West College facility has a raised floor for access to most areas. However, running vertically in walls will require conduit stubs from floor to junction box. It is in the scope of this section to provide all required conduit, installation, and patching/painting required in order to reach the necessary locations with conduit.
2. No line-voltage electrical work is anticipated at this location.

B. Broadcast Systems

1. Switching & Monitoring

- a. Provide a portable broadcast-style production video switcher with integrated multiviewer, video playback from HDD, and CG software with all accessories as shown in the equipment list and in the drawings.
- b. The video switcher shall be configured and programmed to be fully operable, and be delivered in a "turn-key" manner.
- c. The video switcher shall be placed on a pull-out shelf and all connections shall be via patch cable from an XLR/BNC bulkhead connection panel. This will allow the switcher to be portable in nature, and taken to other locations as needed.
- d. A professional grade, HDCP-compliant LCD monitor with 3G HD-SDI inputs shall be provided for use with the switcher's multiviewer output.
- e. Provide powered loudspeakers for audio monitoring.
- f. Provide hard carry cases for the switcher, switcher controller, keyboard/mouse, and 24" video monitor.

2. Cameras & Control

- a. Provide (3) standard-definition analog pan/tilt/zoom cameras. Provide mounts as indicated in the drawings.
- b. Provide a PTZ camera controller, complete with preset recall and access to PTZ functions.

3. Streaming

- a. The owner shall provide a streaming encoder with composite video and stereo audio inputs. Bring audio and video inputs to a bulkhead-type patch bay for connection to the switcher as needed.

4. Utility

- a. For cable TV confidence monitoring, provide a small LCD panel with integrated CATV tuner.
- b. A VGA to HD-SDI scan converter, a video distribution amplifier, and an HD-SDI distribution amplifier shall be provided. and a sync/test generator shall be provided.
- c. Provide bulkhead type XLR and BNC patchbays for audio and video as indicated in the drawings, complete with patchcords in quantities indicated. Provide ultra-flexible, highly robust patch-cord style XLR and BNC cables, similar to a standard patch cable.
- d. Provide a UPS unit. Fan shall only operate when UPS is running on battery power.
- e. Provide in-rack power sequencing and protection systems.
- f. Provide a furniture system for the broadcast control desk as shown in the drawings.
 - 1) Base module: Winsted LCD/3 Console with central cableway, floor levelers, footrest and all necessary hardware.
 - 2) Finishing Panels: Provide exterior steel finishing panels for sides & top of assembly. All steel parts shall be provided in black, all wood parts shall be finished using a manufacturer standard laminate, to be determined during the submittal phase.
 - 3) Work Surface. Provide continuous work surface, made of MDF with high-pressure laminate.
 - 4) Provide sliding rack drawers for any unused rack space in the lower rack section, and provide blank panels for any unused rack space in the upper section.

5. Control System

- a. Provide a 5.7" color touchscreen in the broadcast control room to enable the broadcast technician to control the presentation AV system. Separate controls shall be provided for both training room and broadcast feeds. Broadcast feed controls shall only be available on this touchpanel, and not on the training room control panels.
- b. Provide all necessary interfacing and programming for the existing control system necessary to facilitate these changes.

C. Presentation Systems

1. Audio DSP Programming

- a. Updates to the (e) audio DSP will be required, and are in the scope of this work. Provide as necessary to facilitate complete operation.
- b. A DSP expansion device shall be provide and fully integrated into the system.
- c. Provide one new microphone input at each of three (e) floor boxes. The new microphone input shall be used in conjunction with a portable conferencing system. Configure the DSP inputs as necessary.
- d. Provide new input panels in each floor box, maintaining all connectivity. The new input panel shall be properly sized for the floor box. Discard (e) input panel.

2. Video Systems - Display

- a. Owner has installed (3) flat-panel LCD video displays, one in each meeting room. Provide VGA and serial control connectivity to these new flat panel displays using CAT-based extension products. Connect CATV feed to each display as well. Provide all necessary CATV devices to make a complete system, with +/- 5dBmV output at each display.
 - b. Replace (e) 4x4 VGA+A matrix switch with a (n) 8x8 VGA+A matrix switch. Though not all connection points will be used as part of this scope, it will allow for future planned expansion.
3. Control System
- a. Additional control system programming of existing processor & touchpanels will be required to facilitate the work in this scope. This programming is in the scope of this work. Existing code will be provided to the winning bidder.
 - b. The (e) control system includes a main processor, expansion units, and (3) touchpanels.
 - c. Additions to the existing control system shall include:
 - 1) (3) flat-panel display controls, including power, source, channel, and volume.
 - 2) Expanded matrix video switcher and audio DSP controls as needed facilitate display & streaming control.
 - 3) New 2-way connection to video matrix (replace existing 1-way connection), with the purpose of enabling feedback on touchpanels from matrix.
 - 4) New UPS controls via network, to allow for complete system shut-down.
 - 5) New power sequencing controls via GPIO interface, to allow for complete system shut-down.
 - 6) Confirmation that all (e) equipment and functions are working and fully retained following completion of new work.
4. Existing Equipment Racks & Equipment- Presentation
- a. Currently, the presentation equipment resides in a half-height equipment rack. In order to facilitate additional equipment space, all equipment will be moved into one new full-height swing-out rack. It is in the scope of this work to complete the move, including any new wiring extensions required. We have endeavored to place the rack where the least amount of extension would be needed.
 - b. Follow industry best-practices for installation, including proper lacing bars, cable strain relief, and associated methods.
 - c. Provide rack mount kits for any device in the rack that is not currently rack-mounted.
 - d. New power and power raceways will be added to the rack.
 - e. After the equipment is moved and connected, it is in the scope of this work to confirm all equipment is properly functioning, and operates as it did prior to the move.
5. Utility/General
- a. Provide a UPS system, complete with integrated network control to facilitate complete system shut-down via touchpanel controls.
 - b. Provide two power sequencing and conditioning devices. Connect to control system via GPIO ports to turn the system on/off in a proscribed fashion.

1.08 CURRENT TECHNOLOGY:

- A. Only the most current hardware and software shall be provided. In no case will discontinued or superseded products be acceptable. If the manufacturer has developed and successfully released products that meet or exceed the criteria within this specification, the Contractor shall notify the Owner's Representative and submit the new product for review. If accepted, the products shall be provided at no additional cost to the Owner. Software upgrades and authorized support services for its proper integration into the system shall be provided at no cost to the Owner throughout the warranty period.
- B. In the event of known product defaults or recall, the Contractor shall immediately notify the Owner's Representative and make immediate arrangements for remedy.
- C. None of the stipulations herein shall be grounds for revision to the Project schedule.
- D. See related procedures under Warranties in this Section.

1.09 SUBSTITUTIONS:

- A. All requests for substitutions from the specified materials, assemblies or related services shall be submitted for review by Owner's Representative in accordance with Section 1. Requests shall be made in a timely fashion so as to not affect the Project schedule in either case of the substitution being accepted or rejected.
- B. Documentation for the substitution shall be submitted with supporting material and shall including the related information for the item as specified so that equivalence can be demonstrated. The burden of proof rests solely upon the Contractor. The Owner's Representative shall be the sole evaluator of the fitness of the substitution.
- C. All expenses related to the substitution including, but not be limited to, all fees and expenses incurred in the evaluation of the substitution, and any effect on the costs and schedule of other trades whether or not the substitution is accepted, shall be borne by the Contractor.

1.10 SUBMITTALS:

- A. If permitted under Section 1, all submittals shall be made in electronic format.
 - 1. Files shall be in .pdf format, and submitted via CD or DVD.
 - 2. Clearly indicate submittal number and description in the file name of the document.
 - 3. Each document shall be a separate file.
 - 4. Markups will be made electronically, and the submittal returned via CD or DVD.
- B. Submittals shall be made in a timely fashion so as to not affect the Project schedule, and shall allow for adequate time for review and resubmittal. Partial submittals will not be acceptable and will be returned without review.
- C. Submittals shall be reviewed and field dimensions verified prior to commencing acquisition for, and fabrication of the Work in this section. All services and parts of the work in this section shall be verified through the submittal process.
- D. Prior to commencing work on shop drawings, the contractor shall facilitate a meeting between the contractor and Owner's Representative and his consultant to "walk through" the AV systems.
- E. Conduit, Backboxes and Electrical Systems Verification Letter:
 - 1. Within 30 days of contract award, the AV contractor shall review all relevant information pertaining to the AV systems low-voltage conduit, backboxes, and linevoltage electrical work to be performed by Division 26. A formal memo, outlining acceptance (or desired changes) of the contract drawing shall be provided. Failure to provide this memo indicates acceptance of, and liability for, the conduit, backboxes and electrical systems as indicated in the Drawings.

F. Shop Drawings:

1. Submit full-size (minimum 30" x 42") scaled shop drawings that show the following:
 - a. Installation requirements and mounting conditions.
 - b. For loudspeaker clusters, or any device suspended from above: Provide stamped structural drawings by a structural engineer licensed in the State California.
 - c. Full system riser diagram(s) illustrating interconnection of system components, wiring requirements, back box sizes and any special installation considerations.
 - d. Block diagrams, showing equipment interconnection.
 - e. Internal DSP programming (may be submitted as software file, or in flowchart form on paper)
 - f. Equipment rack and patchpanel drawings.
 - g. Full-scale drawings of custom plates.
 - h. Run sheets or field wiring drawings.
 - i. Equipment modification drawings, including statement of purpose for modification and agreement to provide full manufacturer warranty, if modifications cause a voided warranty.
 - j. Final schematic drawings of any custom circuitry.
 - k. Detailed equipment list, including quantity, manufacturer and model.
 - l. Detailed product drawings, as applicable to the project.
 - m. Copies of contract drawings will not be accepted as shop drawings, and will be returned without review.
2. AV Control System Touchpanels:
 - a. Provide an electronic file for approval of working touchpanel files. File shall be in a format that both consultant and The Owner can use on any windows-based computer (with required software installation.)
 - b. Provide any required viewing software.
 - c. Touchpanel design subcontractor is responsible for design of touchpanel layouts, but shall be subject to consultant and Owner's Representative approval.
3. Acceptance of any submitted data or shop drawings for material, equipment, apparatus, devices, arrangement and layout shall not relieve contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, and installation details to perform efficiently the requirements and intents of the systems design. Such acceptance shall not relieve the contractor from responsibility for error, omissions or inadequacies of any sort on submitted data or shop drawings.

G. Product Data:

1. Submit a detailed equipment list, including manufacturer, model number, description and quantity for each item.
2. Do not submit equipment cut sheets, except for custom or non-standard devices.

H. Samples:

1. Submit samples for review. Samples may include, but are not limited to:
 - a. Connector, panel and cable assemblies
 - b. Panel finish samples
 - c. Custom switch, button or similar assemblies

- I. Record Documents: Submit record documents in accordance with Section 01770.
 - 1. At time of final acceptance, submit regulatory listings and certifications as required by prevailing building codes.
 - 2. Submit copies of "as-built" documents including:
 - a. Shop drawings, product data, operations and instructions manuals for all products provided.
 - b. Equipment list, with manufacturer, model number, and serial number for all installed devices.
 - c. Electronic backup on Compact Disc of control systems or DSP systems programming.
 - d. Care and maintenance instructions, service line and online contacts.
 - e. Warranty documents.
- J. Submittal procedures and quantities are specified in Section 01300.

1.11 WARRANTY:

- A. Warranty shall provide coverage of material and product defects and assembly workmanship or installation for a period of two years following the date of acceptance by the Owner's Representative.
- B. Items under warranty shall be serviced to the satisfaction of the Owner with 14 days of notification to the Contractor.
- C. The Contractor shall bear all costs that arise as a result of the warranty claim, including, but not limited to, the use of temporary replacement components, additional Owner staffing or overtime, shipping, cancelled uses or performances.
- D. Activate all manufacturers' warranties in the name of the Owner, within one week of the date of acceptance.
- E. Provide two return visits following system acceptance to fine tune or repair any items requested by the Owner:
 - 1. 30-40 days following acceptance
 - 2. 1 year following acceptance

1.12 QUALITY ASSURANCE:

- A. Equipment in this Section shall be provided by specialty subcontractors and manufacturers meeting the qualifications listed herein.
 - 1. Specialty subcontractor shall have been continuously engaged in the sales and integration of audio, video and communications equipment similar to that specified herein for a minimum of ten years.
 - 2. Contractors must have at least one permanent staff member holding the following qualifications:
 - a. AMX Programming Certification
 - b. Infocomm CTS or CTS-I Certification
 - 3. Specialty subcontractors shall have at time of bid and continuously maintain throughout the project and warranty period a C-7 and/or C-10 California Specialty Contractor's license appropriate for the work in this Section.
 - 4. Specialty subcontractors shall employ field service technicians within a four hour driving distance from the Project site.

- B. All equipment shall be UL or ETL listed and bear the appropriate labels.

1.13 DELIVERY, STORAGE AND HANDLING:

- A. Packing shall prevent damage to the equipment during transit. Costs to repair or replace all equipment damaged during the course of the contract services shall be borne by the Contractor.
- B. Do not deliver materials in this Section until building is ready for installation. Contractor is responsible to properly sequence the work and to protect from damage during delivery, handling, storage and installation.
- C. Contractor is responsible to coordinate and provide secure and protected storage as required for the execution of the Contract.
 - 1. Devices shall not be delivered to the project site until the project is suitably clean and all adjacent finish work that may be painted or produce dust has been completed. The contract shall provide and maintain complete protection of all devices until the Project has been made available for occupancy by the Owner. The contractor shall thoroughly clean and remove any dirt or dust that infiltrates system components and be responsible for timely replacement of any damaged components.
 - 2. Device labels and connectors shall be delivered with temporary dust and paint protection installed.

1.14 PROJECT CONDITIONS:

- A. Defects in the field which may impact the work in this Section shall be reported to the Owner's Representative and corrected in accordance with the requirements of the applicable Section of Work prior to commencement of the Work in this Section.

1.15 MAINTENANCE:

- A. Provide maintenance stock of user-serviceable components within the system. Maintenance stock shall be packaged in labeled long term storage packaging and turned over to the Owner at time of system commissioning.
- B. Maintenance stock shall include:
 - 1. Four fuses of each type in the system.
 - 2. Five connectors of each type in the system.
 - 3. Six spare keys of each type in the system.
 - 4. Any non-standard tools required for Owner service.
 - 5. Four spare lamps for each type in the system.

PART 2 - PRODUCTS**2.01 PRE-APPROVED SPECIALTY SUBCONTRACTORS**

- A. The following AV systems contractors are pre-approved to complete the work in this section:

Anderson Audio Visual - East Bay
Attn: Jeff McDonald
1315 63rd Street
Emeryville, CA 94608
Phone: (510) 652-5030
Fax: (510) 652-5037

Coda Technology Group
Attn: Mark Latimer
1370 Redwood Way, Suite C
Petaluma, CA 94954
Phone: 707.795.3522
Fax: 707.795.3526

PCD, Inc.
Attn: Henry Beaumont or John Rudolph
1032 Maxwell Drive
Santa Rosa, CA 95401
Phone: (707) 546-3633
Fax: (707) 575-6818

- B. All other contractors shall submit qualifications for approval. In order to qualify, the contractor shall submit the following information to the Owner's Representative for review:
1. Five years of financial reports.
 2. List of personnel who will be working on this Project, including skills, experience, and accreditations.
 3. List of union affiliations, contractor licenses, and other applicable trade certifications.
 4. List of projects completed within the past 5 years, with references. Provide phone and/or e-mail addresses for reference contacts.
 5. Proof that at least 5 jobs in the past 5 years have a minimum contract value equal to or greater than the project listed herein.
 6. Proof of bonding and insurance

2.02 MANUFACTURERS:

- A. AV equipment in this Section shall be provided by specialty manufacturers providing products meeting the specifications herein.
- B. Provide all equipment as listed in 274116-A, equipment list.

2.03 SYSTEMS:

- A. Audio Systems General Requirements:

1. Grounding: All grounding in racks is the responsibility of the AV contractor. All devices shall be appropriately grounded to the isolated grounding system busbar.
2. Un-Balanced Devices: Provide a balancing transformer for any unbalanced device, at both input and output.

3. Loudspeaker Rigging: All overhead loudspeaker rigging shall be reviewed and stamped by a licensed structural engineer working in the State of California. The contractor is responsible to secure the structural stamp, including all expenses associated therein.

B. Video Systems General Requirements:

1. Signal-to-noise ratio (peak to RMS) unweighted DC to 4.2MHz: 55dB minimum
2. Crosstalk: Unweighted DC to 4.2MHz: 45dB minimum
3. Frequency Response: Within plus or minus .5 dB to 4.2 MHz
4. Line and field tilt: 2% maximum
5. Differential Gain: 3% maximum
6. Differential Phase: 2 degree maximum
7. Video System timing: Sync coincidence within 50 nanoseconds
8. Color timing: Within 2 degrees at 3.58 MHz

2.04 MATERIALS:

- A. All components supplied under this Section shall be new. Used or factory reconditioned components will not be acceptable.
- B. Floor Standing Swing-Out 19" Equipment Rack (Chambers & West College):

1. Provide Middle Atlantic SR-series. See drawings for exact sizes.
2. 500 lb. weight capacity.
3. All structural elements shall be finished in black powder coat.
4. Rack shall be UL Listed.
5. Provide the following options:
 - a. Solid Front Door, model #FD-xx.
 - b. Lacer strip, heavily perforated, 77" long, model # LACE. Two per rack.
 - c. Copper Bus Bar, model #BB-xx. One per rack.
 - d. Magnetic Work Light, model #WL-60. One per rack.
 - e. Custom rack mounts for equipment without rack ears, model #RSH-series.
 - f. Patchcord holder, model #CLAW14, one per rack.
 - g. For conditions where two racks are adjacent, provide Zero Clearance Latch, model #DWRSR-ZL.
6. Provide the following for power management at Chambers:
 - a. Power raceways as required, model PDW-series.
 - b. Non-switching front-mounted convenience outlets. Minimum one duplex outlet per rack group. Provide Tripp Lite DRS1215 or equal.
7. Provide the following for power management at West College:
 - a. Power distribution will be handled by rack-mount sequencing/protection units.
 - b. Non-switching front-mounted convenience outlets. Minimum one duplex outlet per rack group. Provide Tripp Lite DRS1215 or equal.

C. Floor Standing 4-post open rack (Chambers- IT equipment):

1. Provide Middle Atlantic R4-series. See drawings for exact sizes.
2. 800 lb. weight capacity.
3. All structural elements shall be finished in black powder coat.
4. Rack shall be UL Listed.
5. Provide the following options:

- a. Lacer strip, heavily perforated, 77" long, model # LACE. Two per rack.
 - b. Copper Bus Bar, model #BB-xx. One per rack.
 - c. Custom rack mounts for equipment without rack ears, model #RSH-series.
6. Provide the following for power management:
- a. Power raceways as required, model PDW-series.
 - b. Non-switching front-mounted convenience outlets. Minimum one duplex outlet per rack group. Provide Tripp Lite DRS1215 or equal.
- D. Connectors:
1. Microphone and Line Level Audio
- a. XLR-M, 3-pin:
 - 1) For panel-mount, Provide Neutrik NC3MD-L-1, 3-pole male XLR connector.
 - 2) For cable-end, provide Neutrik NC3MXX, 3-pole male connector.
 - b. XLR-F, 3-pin, Standard
 - 1) For panel-mount, Provide Neutrik NC3FD-L-1, 3-pole female XLR connector.
 - 2) For cable-end, provide Neutrik NC3FXX, 3-pole female connector.
2. Video:
- a. Production Video:
 - 1) For panel-mount, Provide Neutrik NBB75DFI, Recessed bulkhead jack, feed through, isolated connector.
 - 2) For cable-end, provide Neutrik NBNC75P-series, push-pull style connector. Use appropriate connector for cable specified.
3. Data:
- a. RJ-45
 - 1) For panel-mount, provide Neutrik Ethercon NE8FDP feed-thru connector.
 - 2) For cable end, provide Neutrik Ethercon NE8MC-series connectors.
- E. Patchbays:
1. Microphone and Line Level Audio:
- a. Provide Bittree 481 Classic series with ID (punchdown) style termination with the following options:
 - 1) Longframe ¼"-style connectors
 - 2) 2x26 jacks with 12" deep chassis
 - 3) 2 designation strips in over/under configuration
 - 4) Mono spacing, 2 RU
 - 5) Isolated Grounding
 - 6) Normals per Drawings
 - 7) Black in color
 - 8) Paper designation strips. Provide .doc file to Owner for future use.

- 9) Provide Middle Atlantic "CLAW14" patchcord holder, one per rack.
 - b. Patchbay layout shall be in standard "output at top, inputs at bottom" scheme with clear method for showing normals. Contractor shall be responsible for exact patchbay layout.
 - c. Labeling shall be as follows:
 - 1) All labeling shall exactly match circuit in field.
 - 2) Labeling shall be sequential per circuit type, beginning at 1.
 - d. Or equal by AVP, Inc.
2. Composite/HD-SDI Production Video:
- a. Provide Bittree Video WECO Composite series Hi-Definition patchbay.
 - b. Provide the following configuration:
 - 1) WECO-style connectors
 - 2) 2x26 jacks with 12" deep chassis
 - 3) 2 designation strips in over/under configuration
 - 4) 2 RU
 - 5) Normals per Drawings
 - 6) Black in color
 - 7) Paper designation strips. Provide .doc file to Owner for future use.
 - 8) Provide Middle Atlantic "CLAW14" patchcord holder, one per rack.
 - c. Or equal by AVP, Inc.
3. Data:
- a. RJ-45
 - 1) Leviton Gigamax 6-series patchbays.
 - 2) Or Equal
4. Bulkhead Patchbay (West College)
- a. Provide AVP, Inc, Universal Bulkhead system, model WK-U212E2-Z, loaded with the appropriate connectors.
 - b. Provide blanks in unused positions.
 - c. Provide paper designation strips. Provide .doc file to Owner for future use.
 - d. Provide Middle Atlantic "CLAW14" patchcord holder, one per rack

2.05 PANELS:

- A. General: The control receptacle panels shall consist of the appropriate connectors required for the system.
- B. Physical:
 - 1. Faceplates shall be 0.080" aluminum, edges eased, finished in fine texture, scratch resistant powder coat, with fasteners countersunk.
 - a. Panels specified as flush mounted shall overlap back box by 1/2". Surface mounted panels shall match back box size with no gaps or overlap.
 - b. Coordinate back box type, size and mounting with Division 26.

2. Color shall be black unless otherwise noted.
3. Panels noted as custom color shall be factory powder coated a color selected by the Owner's Representative. Legends shall be laser etched.
4. Laser etched labels 1/8 or 1/4" high characters minimum, unless otherwise noted.
 - a. Labeling shall be as indicated on the Drawings.
 - b. Use Arial font.
5. Wall mounted panels shall mount into an industry standard back box, depending on size and quantity of connectors.
6. Rack mounted panels shall mount within industry standard equipment racks.
7. Panels mounted in floor boxes shall include a translucent flexible vinyl dirt guard as indicated on Drawings.
8. Provide complete hardware for mounting on gridiron hangers where indicated on the Drawings.
9. Provide black aluminum cable tie-off bars on all panels 8" wide and larger, as indicated on the Drawings.
 - a. Keystone Electronics Corporation "Aluminum Oval Instrumentation Handles", part number 546, 5" wide x 2" deep handle. www.keyelco.com; 800-221- 5510

PART 3 - EXECUTION

3.01 INSTALLATION- GENERAL:

- A. Coordinate with Division 26 for the proper installation of the conduit, backboxes, and electrical service as specified herein.
- B. Coordinate scheduling and access with the Contractor and provide personnel lifts or ladders as required for access to the AV equipment.
- C. Remove all packing materials from the Project Site. Insert operations and maintenance information into the Project record documents as specified above in Submittals.
- D. Record Block Diagram: Post a laminated 11x17 as-built block diagram of the entire system (split into multiple sheets as necessary), and physically attached to the equipment rack in a logical location for Owner reference.

3.02 CABLE INSTALLATION:

- A. Mark cables, regardless of length, with permanent, non-handwritten number or letter cable markers within 6-inches of both ends. There shall be no unmarked cables in the system. Marking codes used on cables shall correspond to codes used on Drawings and schedules.
- B. As indicated on the Drawings, group cables according to signal type. Up to 6 separate conduit systems may be in place, divided as follows:
 1. A: Microphone Level Audio
 2. B: Line Level Audio
 3. C: Video and Communication Level
 4. D: Loudspeaker Level
 5. E: Empty/Future expansion
 6. F: Fiber Optic Level

- C. As much as possible, maintain separation of signal types when outside of conduit.
- D. No cable shall be installed with a bend radius less than recommended by the manufacturer.
- E. Cables types shall be as indicated on the Drawings. In plenum spaces, provide the plenum version of the specified cable type.

3.03 PROTECTION OF PROPERTY:

- A. Contractor is responsible to provide protection for all equipment, tools and materials delivered to the Project Site prior to final acceptance by Owner. Any loss or damage is the responsibility of the contractor, until final acceptance by Owner.

3.04 SEQUENCING:

- A. The contractor shall not install any electronic equipment until the room where the equipment shall be located has been finally painted or otherwise finished, and cleaned by the Contractor or Owner's Representative. Any damage to equipment resulting from failure to follow this requirement will result in the contractor replacing the damaged equipment at their cost.

3.05 COMMISSIONING AND DEMONSTRATION:

- A. Coordinate with Division 26.
- B. Appropriately trained personnel shall review, test, program and otherwise complete the system, following completion of installation.
- C. Upon completion of the installation, the Contractor shall notify the Owner's Representative that the system is available for formal checkout. Notification shall be provided in writing. Checkouts shall be scheduled in accordance with the Owner's Representative's schedule.
- D. Provide to the Owner's Representative and or his Consultant the following upon arrival:
 - 1. Measurements showing all Ethernet wiring complies with Category 5e or Category 6 requirements for full bandwidth operation.
 - 2. Verification that every line has been sweep tested and conforms to standard requirements per signal level.
 - 3. Demonstration of input and output of signal throughout the entire system.
- E. Make available for review by the Owner's Representative and or his Consultant:
 - 1. All components for physical inspection and inventory.
 - 2. A computer to access any DSP units.
 - 3. All installed devices in full operation, with no temporary equipment in place.
 - 4. All portable devices, fully complete, and available to test at all plug-in locations.
 - 5. Test equipment, including:
 - a. High quality media for every presentation source
 - b. Analog & Digital video test generators
 - c. Portable TV with CATV receiver input
 - d. AC voltmeter
 - e. Sound level meter
 - f. Portable amplified loudspeaker
 - g. Waveform monitor (oscilloscope)
 - h. Audio analysis equipment (provides real time display, pink noise source, test oscillator, level and THD+N measurements)
 - i. Cablesets, adapters, and connectors for inserting the test equipment into and out of the system's user interfaces and connector plates.

- F. The Contractor shall be liable for any return visits by the Owner's Representative and/or his consultant as a result of incomplete or incorrect installation, or erroneous representation that the Systems are complete and ready for the Owner's Representative to carry out its work.
- G. The Contractor shall arrange for access as necessary for inspection of equipment by the Owner's Representative and or his consultant
- H. Upon completion of the commissioning, Contractor shall demonstrate operation and maintenance of the system to the Owner. Coordinate with the Owner's schedules two weeks in advance minimum.

3.06 TRAINING:

- A. Training shall include, but not be limited to:
 - 1. Safety precautions.
 - 2. Identification of all elements provided under this section.
 - 3. Maintenance, diagnostics and trouble shooting.
 - 4. Operation of system, including necessary software training.
 - 5. Operations and maintenance manual orientation.
- B. Provide 8 hours of training, minimum, split over two consecutive days.

3.07 PROJECT CLOSEOUT:

- A. See submittal section above for required closeout documents.

3.08 APPENDIX:

- A. 27 4116-A Equipment List

Santa Rosa City Council & West College AV Systems Equipment List

Notes: 1. Conduit, backboxes and electrical power required for A/V systems are provided under division 16 work.
 2. This list contains key components, but does not list every piece needed for a complete system.
 Contractor is responsible to provide a complete and working system, regardless of the completeness of this list.
 3. A/R = As Required.
 4. OFCI = Owner Furnish, Contractor Install

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
CITY COUNCIL CHAMBERS					
	Broadcast Systems				
	<i>Video Switcher</i>				
1VI	Video Switcher	NewTek	Tricaster 850	1	
2VI	Video Switcher- Master Controller	NewTek	Live Control LC-11	1	
3VI	Video Switcher- Factory Training	NewTek	Two Days, On Site	1	
4VI	40" LCD Monitor, 1080p, Broadcast Grade	TV Logic	LVM-403W-3G	1	
5VI	Powered Loudspeaker	Yamaha	HS50M	1	pair
6VI	<i>Character Generator</i>				
7VI	Video Switcher- Remote Title Software	NewTek	LiveText	1	
8VI	Rackmount CPU, key, mouse	Dell	r5500	1	per mfr recommendations
9VI	18.5" Rack Mount Monitor	Marshall	V-R185-DLW	1	
10VI	<i>Camera</i>				
11VI	PTZ Camera, HD, Black	Vaddio	Wall View CCU HD-20 SDI	4	provide HD-SDI card
12VI	PTZ Camera- Dome Mount, Wall	Vaddio	DomeView Indoor	2	wall mount adapter
13VI	PTZ Camera- Mount, Wall	Vaddio	Wall Mount Bracket	2	
14VI	PTZ Camera- Control	Vaddio	Production View Precision	1	
15VI	Fixed Camera, HD-SDI (confidence)	Vitek	VTC-HD713A	2	provide PSU
16VI	Fixed Camera Lens	Fujinon	A/R	2	
17VI	Fixed Camera Mount	Vaddio	Expandable Wall Mount	2	
18VI	<i>Utility</i>				
19VI	16" LCD Monitor, CATV input (confidence)	Viewsonic	N1630W	1	provide mount to tower
20VI	Blu-Ray Player, BD2.0, 7.1 Analog out, RS-232	Oppo	BD-93	1	or equal
21VI	Blu-Ray Player, rackmount	Middle Atlantic	RSH Series	1	
22VI	Composite Video DA, 1x6	Extron	DA 6V EQ	3	Provide Rack mount
23VI	HD-SDI Video DA, 1x4	Brighteye	42	2	Provide Rack mount & PSU
24VI	Scan Converter, VGA/DVI to HD-SDI	TV One	C2-2355A	1	Provide Rack mount
25VI	Test & Sync Generator, 3G	Brighteye	57	1	Provide Rack mount

THE SHALLECK COLLABORATIVE

SANTA ROSA CITY COUNCIL
AV SYSTEMS UPGRADE

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
26VI	3G Sync DA, 1x4	Brighteye	43	2	Provide Rack mount & PSU
27VI	Audio DA, 2x16	Rane	DA-216S	1	
28VI	Audio Patchbay	AVP	A/R	A/R	
29VI	Audio Patch Cable, Red, 3'	AVP	A/R	25	
30VI	Video Patchbay, Composite & HD-SDI	AVP	A/R	A/R	
31VI	Video Patch Cable, Blue, 3', HD-SDI	AVP	A/R	25	
32VI	Data Patchbay / RJ-45	Leviton	Gigamax 5e Series	A/R	see specs for further info
33VI	RJ-45 to RJ-45 Patch Cable, Green, 3'	Contractor	Contractor	10	
34VI	Ethernet Switch, Gigabit, 24-port	Cisco	A/R	1	
35VI	Power Sequencing Control	Lyntec	SS2LRP	1	connect to breaker panel (by elec)
36VI	Power Distribution, rackmount, no switch	Middle Atlantic	PD-915R-PL	4	at broadcast control furniture
37VI	UPS System	Middle Atlantic	UPS-1000R	1	at broadcast control furniture
38VI	Custom Plates & Panels	Contractor	A/R	A/R	
39VI	<i>Outbound Broadcast & Caption</i>				
40VI	Streaming Appliance	Granicus	OFCI	1	OFCI
41VI	Closed Caption Encode/Decode	Link Electronics	PDR-885	1	
42VI	Closed Caption IP Link (master & slave)	Link Electronics	LEI-592	2	
43VI	<i>Equipment Racks</i>				
44VI	Equipment Racks / Furniture (broadcast)	Winsted	LCD/3 System	A/R	see specs for further info
45VI	40" Monitor Mount	Winsted	M-View	A/R	see specs for further info
46VI	Wall Mount Swing-Out Rack (existing presentation)	Middle Atlantic	SR Series	1	see specs for further info
47VI	Four-Post Rack (existing IT/Data)	Middle Atlantic	R4 Series	1	see specs for further info
48VI	In-Rack Power Distribution raceway	Middle Atlantic	PDW Series	2	at presentation & IT rack
49VI					
50VI					
51VI	Miscellaneous Hardware				
52VI	Wire & Cable				
53VI	Labor				

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Presentation Systems				
	<i>Audio System</i>				
1MA	Lectern Microphone, 20" (public table)	AKG	GN 50 E 5PIN + CK31	1	At doc cam, connect to (e) DSP
2MA	Lectern Microphone, Flush Pocket	FSR, Inc.	T3-MJ+, ALU	1	At doc cam
3MA	<i>Video Systems</i>				
4MA	Projection Screen, 4:3 aspect, Motorized, White case	Da-Lite	Large Cosmo Electrol	1	123" x 164" plus ~3'-0 black drop
5MA	Projection Screen Line Voltage Control	AMX	UPC 20+	1	coordinate w/ elec for connection
6MA	Projector Lens for (e) projector	Christie	A/R	1	for (e) LX505 projector
7MA	Projector Wall Mount for (e) projector	Peerless	PWA-14W	1	or equal
8MA	55" LCD/LED Flat Panel Display w/ Tuner & RS-232	Samsung	ME55A	2	or equal
9MA	Flat Panel Display Mount, Articulating Arm Type	Chief	TS525TU	2	or equal
10MA	VGA & 232 Tx Device w/ rackmount	Extron	MTP T 15HD RS	2	Flat Panels
11MA	VGA & 232 Rx Device	Extron	MTP RL 15HD RS	2	Flat Panels
12MA	VGA DA, 1x6	Extron	P/2 DA6xi	1	replace existing 1x2
13MA	Rackmount for three (e) CAT5 devices	Extron	A/R	1	mount existing
14MA	Blu-Ray Player, BD2.0, 7.1 Analog out, RS-232	Oppo	BD-93	1	replace existing DVD
15MA	<i>Utility & Control</i>				
16MA	Button Panel (public table), 4-button, white	AMX	Mio Classic S	1	custom engraved
17MA					
18MA					
19MA	Miscellaneous Hardware				
20MA	Wire & Cable				
21MA	Labor				

THE SHALLECK COLLABORATIVE

SANTA ROSA CITY COUNCIL
AV SYSTEMS UPGRADE

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
WEST COLLEGE TRAINING FACILITY					
	Broadcast Systems				
	<i>Video Switcher</i>				
1VI	Video Switcher	NewTek	Tricaster 300	1	
2VI	Video Switcher- Master Controller	NewTek	Live Control LC-11	1	
3VI	24" LCD Monitor, 1080p, Broadcast Grade	Marshall	V-R241-DLW	1	
4VI	24" LCD Monitor Desk Stand	Marshall	V-ST23-32	1	
5VI	Rolling Hard Case for Switcher/Controller	Pelican	A/R	1	
6VI	Rolling Hard Case for 24" monitor & stand	Pelican	A/R	1	
7VI	Rack Shelf w/ rear rails	Middle Atlantic	A/R	1	for Tricaster
8VI	<i>Camera</i>				
9VI	PTZ Camera, HD	Vaddio	Wall View 70 PTZ	3	includes mount
10VI	PTZ Camera- Control	Vaddio	Production View Precision	1	
11VI	<i>Audio Monitoring</i>				
12VI	Powered Loudspeaker	Yamaha	HS50M	1	pair
13VI	<i>Control Systems</i>				
14VI	5.7" Touchpanel, Rackmount	AMX	NXD-500i	1	
15VI	Programming/Accessory	AMX	A/R	1	
16VI	<i>Streaming Video</i>				
17VI	Streaming Appliance	Granicus	A/R	1	OFCI
18VI	<i>Utility</i>				
19VI	LCD Video Monitor, Video, VGA, HDMI, Desktop	Viewsonic	n1630w	1	CATV confidence
20VI	Composite Video DA, 1x6	Extron	DA 6V EQ	1	portable
21VI	HD-SDI Video DA, 1x4	Brighteye	42	1	portable
22VI	Scan Converter, VGA/DVI to HD-SDI	TV One	C2-2355A	1	Provide Rack mount
23VI	Patchbay, BNC/XLR Bulkhead	AVP	A/R	A/R	
24VI	Patch Cords, XLR>XLR, Red, 3'	AVP	A/R	20	
25VI	Patch Cords, BNC>BNC, Blue, 3'	AVP	A/R	20	
26VI	Equipment Racks / Furniture	Winsted	A/R	A/R	Per Drawings & Specs
27VI	Power Distribution, Protection & Sequencing	SurgeX	SEQ	1	
28VI	UPS System	Middle Atlantic	UPS-1000R-IP	1	
29VI	Custom Plates & Panels	Contractor	A/R	A/R	
30VI					
31VI					
32VI	Miscellaneous Hardware				
33VI	Wire & Cable				
34VI	Labor				

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AV SYSTEMS

REF	DESCRIPTION	MFR	MODEL	QTY	NOTES
	Presentation Systems				
	<i>AV Systems</i>				
1MA	Matrix Switcher, 8x8 VGA & Audio	Extron	MXV 88 VGA A	1	replace (e) 4x4 matrix
2MA	VGA & 232 Tx Device w/ rackmount	Extron	MTP T 15HD RS	3	Flat Panels
3MA	VGA & 232 Rx Device	Extron	MTP RL 15HD RS	3	Flat Panels
4MA	Audio DSP Expansion	BiAmp	Nexia CS	1	expansion
5MA	<i>Utility</i>				
6MA	Swing-out Equipment Rack & Accessories	Middle Atlantic	SR Series	1	replace (e) rack, see specs
7MA	Power Distribution, Protection & Sequencing	SurgeX	SEQ	2	
8MA	UPS System	Middle Atlantic	UPS-1000R-IP	1	
9MA	Serial Port Expansion for (e) control system	AMX	EXB-COM2	2	
10MA	CATV Distribution	Blonder Tongue	Splitter/Tap/Amp	A/R	
11MA	AMX Programming	Contractor	A/R	1	existing unit
12MA	Custom Plates & Panels	Contractor	A/R	A/R	
13MA					
14MA					
15MA	Miscellaneous Hardware				
16MA	Wire & Cable				
17MA	Labor				
		END OF SECTION			